Keynote Address : Technology in the Comparative Study of Civilizations

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1. INTRODUCTION

The Taniguchi Symposium on Civilization Studies is now convened for the tenth time. In June 1980, I had the privilege of addressing a symposium convened in honor of my sixtieth birthday. In my remarks on that occasion, I called for efforts toward the construction of a new discipline of civilization studies. What I envisioned was not simply cultural criticism, but the study of civilization as a science, and research toward a paradigm that would differ from the methods of cultural anthropology. I suggested a rubric extending from the ecosystem of humans and nature, to the civilization system of humans and artifacts.

The proceedings of that symposium were published the following year by Chuo Koronsha under the title, *Bunmeigaku no kochiku no tame ni* (For the Construction of Civilization Studies). With that stimulus, the National Museum of Ethnology began planning for a new, ongoing symposium. Fortunately, support was received from The Taniguchi Foundation, and we were able to inaugurate a symposium in the field of civilization studies, as distinct from ethnology.

The symposium has been held since 1983, under the umbrella title of Japanese Civilization in the Modern World. The initial gathering focused on the theme of Society and Life, and in succeeding years the symposium has investigated the themes of The City and Urbanization; Ruling Structures; Economic Structures; Knowledge and Doctrine; Religion; Language and the Written Word; The Home; and Tourism. At this tenth symposium, we are examining the topic of Technology.

I define a civilization as a system of artifacts and institutions. In such a system

of manmade things, a central role is played by technology, and hence it is impossible to discuss civilization in a meaningful way without taking up the topic of technology. This was driven home to me almost forty years ago, when I spent six months, from May to November 1955, traveling in Afghanistan, Pakistan and India. I was struck by the great differences between the forms of civilization in that region and in my native Japan, and the experience awakened my interest in the comparative study of civilizations. My reflections became the basis for my essay, *Bunmei no seitai shikan* (An Ecological View on the History of Civilizations).

Based on my direct impressions, I concluded at the time that civilizations cannot be discussed without considering the elements of hardware that give them their characteristic shapes. These would include large public works projects and telecommunications networks on a national scale. Today of course we would have to include the integrated circuitry used in computers and microelectronic systems. Now, what is the technology that brings those things into existence? Through what sort of technology has the modern civilization of Japan been erected? That is the issue that I would like to probe thoroughly.

As I mentioned, the overall title for these symposia on civilization studies has been Japanese Civilization in the Modern World. In other words, we seek to describe the position of the civilization of Japan within the modern world. What I hope we can accomplish here is to locate the civilization of Japan in terms simply of technology. From the standpoint of civilization studies, technology must be dealt with in terms of its connections to society, and especially its relationship to the social structure. Instead of focusing on various specific techniques, it is necessary to examine the social system which constitutes the soil from which they are produced.

Conventional studies of technology have tended to emphasize the genealogical questions of where certain techniques originated and the routes by which they were transmitted. Studies oriented toward technical circles have been focused on the evaluation of operating principles or materials or performance. It seems fair to say that we have overlooked the viewpoint that approaches technology through its actual relation to the people who live in a society.

Civilization studies is a systems approach. It approaches a civilization as a total system, and hence addresses such issues as what constitutes the system, what historical background the system grew out of, and what sorts of circumstances the system has operated under. At once structuralist and functionalist, it seeks to define the overall framework of a civilization, as a set of people, apparatus, institutions and organizations. I hope the discussions at this symposium will deal with technology in Japanese civilization as both a structuralist and a functionalist world.

There is, however, some danger that the discussion will lapse into cultural theory. Cultural theory, in the sense of intellectual lineages and systems of mental or spiritual values, is but one small part of civilization studies. We must think in terms of a rather more extensive, overall system. The standpoint of civilization

studies, as I envision it, deals with a total image that includes the spatial extent, the systemic structures, and the historical issues pertaining to a given civilization. These are the lines along which I would like to see the discussion develop.

I hope this symposium will smash some mistaken viewpoints which are deeply entwined with the conventional approaches to the history of Japanese technology and Japanese civilization. From the Meiji period onward, the modes of thinking about the history of Japanese technology, and of modern Japanese civilization itself, are clearly suspect. I think it is a mistake to treat the civilization of Japan by focusing on a unique event in the latter half of the 19th century. Concerning the history of science and technology in Europe, as well, I believe many Japanese harbor some gross misunderstandings. By your leave, and with little concern for existing theories, I would like to set forth a few bold hypotheses concerning various points of contention. It is my hope that this may stimulate lively discussion on your part.

2. IS JAPANESE CIVILIZATION A COPY?

Not only in the West but in Asia as well, it is generally thought that Japanese civilization was realized by means of copying Chinese and European civilization. For that matter, the majority of Japanese intellectuals themselves accept the copy theory. Is the civilization of Japan really a copy of the civilizations of China and the West? In fact, a great many new things have emerged from Japan. What are we to make of the continual derision of our achievements as copies, in spite of those things? If we talk about copying, then it must be said that all European technology is copied. I don't see any reason why only the technology of Japan should be called a copy. It would be quite interesting to conduct a specific investigation to determine whether the Japanese-civilization-as-copy theory is true.

Several years ago I delivered some lectures in France. At that time I was often asked, "Why is it only Japan which successfully modernized?" It was obvious that they were expecting an answer to the effect that Japan succeeded because it copied Europe. I always replied with a question of my own. I said, "Didn't France successfully modernize? Didn't Germany successfully modernize? Of course they did. If France and Germany succeeded, what is so mysterious about Japan's success? Isn't it the same thing?"

Where exactly did this Japanese-civilization-as-copy theory originate? By whom was it formulated, and when? By what sort of process did it spread through the world? Now this is only one supposition, but it may well be that the Japanese-civilization-as-copy theory was spread in order to plunge Japan into despair. There was a time when there was strong competition on the American continent between Japanese and Chinese immigrants. It was at just that time that Sun Wen was preaching the Japanese-civilization-as-copy theory. It is possible that his idea that Japanese civilization is no more than a copy of Chinese civilization spread internationally on a rather large scale. In the process of becoming

internationalized, Japanese culture met resistance in the form of a current dragging down the image of Japan. I think we suffered a form of cultural Japan-bashing.

It also seems that when Japan comes out into the world, she runs into problems. In Europe, evaluations of Japanese civilization are terribly warped. There is a tendency to regard Japan with the lowest possible esteem. This leads to such statements as, "Japan is not creative, it all originated with us."

Then there is nationalism, which gives rise to various legends. As just one example, a Russian will tell you that today's rocket technology is entirely the work of Tsiolkovsky. But a German will say that von Braun discovered the principles and so the credit belongs to Germany. The respective achievements must be evaluated, and the truth is that today's rocket technology is a system which was painstakingly constructed as people of various nations racked their brains. It is impossible to claim that it belongs to any single person, or that this is ours and that is yours, or any such clear demarcation. The same is true for every facet of civilization today.

For all that is said about creativity, the fact is that civilization is something which in any country is entirely borrowed. In science, too, we find that European science is almost entirely borrowed from Islam. In Islamic science, while there were some indigenous developments, a great deal was borrowed from Persia. When we look carefully we find that every culture is borrowed. They are all copies. I am not convinced that there is any reason why Japan should be the only one accused of copying.

Perhaps there was something to the blind-imitation theory. It is true that at the start everything was directly imported from the outside. As a result, the idea of blind imitation or of copying may well have remained in the consciousness of the Japanese themselves. Yet the things that were brought in at the start—and they were brought in on a large scale—did not work at all well. There are a number of cases where there were decisive setbacks, where Westernization failed. Dutchmen were employed to build a large harbor near Sendai, and Horace Capron was invited over from America to open up Hokkaido, but both of those projects were complete failures. That approach came to be seen as regrettable from the middle of the Meiji period. We then turned to making various improvements of the sort that would suit Japan. There were instances where Western technology was discarded and existing technology was applied. Hence it was not the case that Western things were simply imported wholesale. Instead, we may even state that when Western technology was introduced, it led to negative results. Plenty of machinery did come in from Europe, but time after time it soon proved to be a failure. It seems that when it was discovered to be no good, we converted it to Japanese modes. Now we have heard that in the end these things caught on. It might be that, as a result, the improvements and inventions were not clearly evaluated, and this gave rise to a sense of having copied.

3. DID JAPAN'S MODERN TECHNOLOGY BEGIN WITH MEIJI?

In studies of Japanese technology up to now, we find the idea that all modern technology came in from the West, from the Meiji period on. Yet isn't that entirely wrong? Tangled up in that concept is the problem of the ideology at the time of the shift from the feudal regime to the Meiji regime. The negation of the previous era and its regime was a very important principle for the Meiji government. In order to emphasize how bad the Edo era had been, everything was attributed to the exploits of the Meiji government, and as that conceptual context was completed, the story developed that every bit of new technology was brought in by the Meiji government from the West.

I think the history of Japanese technology is something other than that. I am not an advocate of technology nationalism, but I do believe that there has been a biased outlook in the history of Japanese civilization. A history of technology based on a rather more objective, comparative study of civilizations ought to be possible.

In Japan technology as a whole made substantial progress during the 17th century. Certainly that cannot be separated from the development of society in modern Japan from the 17th century onward. Various technologies developed within that sphere. Hence there was a native soil, and when things were brought in from elsewhere, a very effective union was possible.

At first things were brought in and tried under the idea that they were quite different from native technology, but in a great many cases it turns out these were technologies that already existed in Japan. A field where there was major change during the Bakumatsu and early Meiji years was metallurgy. Ironmaking. There was a massive increase in production. This can be considered to be qualitatively different from the previous situation. However, agricultural technology of course was there from the beginning, as was civil engineering, as was architecture, as were brewing techniques for sake, malt, miso and soy sauce, not to mention textiles and ceramics. Things were welcomed in under the impression that they were genuinely different, but in actuality all those technologies were already here, and the conjunctions went unnoticed. Those which were connected with native skills were successful. Such was the framework, and I therefore feel that the Meiji sense of shock at the arrival of immensely different things was to a considerable degree an illusion.

Measuring techniques, however, were not highly developed. There is a history of astronomy, but not of land surveying. Ino Tadataka's achievement was in measuring distances. In a country like Japan, which historically held such a remarkable attachment to the land, and carefully subdivided it, why didn't land surveying develop? What might be the explanation? Perhaps it would be connected to mathematics. Trigonometry had not developed in Japan.

Japan had done substantial work in geometry, but still the main thrust of Japanese mathematics was in algebra. This was *wasan* (pre-Meiji Japanese

mathematics), which also included the concept of the differential. At first, *wasan* and Western mathematics were viewed as two different things, but on the theoretical level they are similar. Accordingly, although it was thought that new things came in from the West, it is in fact the case that very similar things already existed.

4. HOW DOES TECHNOLOGY RELATE TO SOCIAL STRUCTURE?

I hope this symposium will address issues relating to how technology is governed by social organization. In order for technology to be discovered, there must be ingenuity and artifice, and a society organized in such a way that it sanctions them. The composition and organization of society in Japan advanced rapidly during the Edo period, after the Sengoku period. It was based on the technologies of civil engineering and architecture. I regard this as a major factor.

In that there is a strong parallel with Europe. These are cases where the organization of society proceeded on the basis of military technology. While China had numerous germinal elements, why wasn't it possible for them to develop as a system? This may be a simplistic idea, but I think it is because the emperor-bureaucracy system precluded it. Throughout Southeast Asia also, there were only "mini-empires," small versions of the Chinese-style empire. Thailand is an excellent example. There is no regional autonomy, for government consists in a king or emperor, and functionaries under his direct control. In such places, it seems that the development of technology is quite difficult.

In Japan's case, by the first half of the 19th century there was a highly developed structure of small businesses. It was very similar to Germany in this respect. In my view, that is a crucial factor. The prototype was the feudal clan. Under the system of feudal clans, the entrepreneurial ability of the Japanese was able to develop to a remarkable degree. It was because such ability existed that the late-19th-century system of civilization could operate. We may even conclude that the modernization of Japan was brought about by the feudal order. The feudal orders of Japan and Germany began at about the same time, in the 13th century.

The social system of Japan from the 17th century, during the so-called later period of the feudal order (which cannot be called purely feudal), brought about something quite significant. The economic structure of the joint-stock company already existed in a prototypical form in 16th-century Japan. This was linked with the social system of the small-business structure. It was a peculiarly Japanese-style development, but it has taken on the same quality as its universal counterpart.

The feudal clans were not the only element. There were also the lands of the *hatamoto* retainers and of temples and shrines. These were quite numerous. They provided more than 200 years of experience in learning just what was entailed in management. When new components are brought into such a society, they can become established with ease. They can be put into operation.

In such a case, it is the principle of competition which is fundamental. In the case of Japan, that principle has operated from about the 13th century. In a place

like China where the empire controlled everything, competition did not arise. In Japan there also existed technology groups which received a sort of license from the authorities. An example is the *Nakai Gumi,* a civil engineering and architecture group under the direct control of the Bakufu. They had a monopoly, but it was a monopoly only on Bakufu projects, and there were also a number of rival groups. Ceramic technology is an ancient tradition in Japan, but looking in particular at the period beginning in the 18th century, in contrast to the centralized bureaucracy of China, the development of ceramic industries was promoted by the local governments, that is, the feudal clans. In Europe too, development proceeded as feudal lords formed leagues and pursued policies of industrial development with respect to regional small-business structures.

Another factor that set the stage for the successful evolution of Japanese technology, a very important factor, was the presence of general engineers. The erection of giant Buddha statues and the construction of roads must have involved progress in what may be called "general systems engineering".

In Japan we do not find a well-developed European-style guild system. The guilds of Japan were commercial institutions. Guilds were not such a notable feature of the artisan society. For Japan, we may say that such a form was adopted in the case of handicrafts, but not for the large-scale technology which appeared around the 18th century.

Rather than commercial guilds along the lines of joint-stock partnerships, in Japan there was organized technology on a large-scale from an early date. I am speaking of specialist groups, organized groups of technicians. These differed from the *Meister* system. Their links with the governing authorities were quite strong. My own theory is that those groups were set in motion by the feudal clan order of the latter half of the Edo period. I think a similar process occurred in Europe as well. Treatments of the history of technology mention only the *Meister* system, but I believe there were other organized groups of technicians.

5. IS JAPAN GROUP-BASED?

There is the idea that Japan is exclusively group-based. If that were really so, then Japanese technology would not have developed to its present extent. Japan consists of organizations and groups and individuals. In that sense we may speak of individualism, but the organizations, with their networks and rules, link the individuals firmly together. Groups do not do that. They are merely aggregations.

The typical forms of individualism differ in the West and in Japan. I describe it in metaphorical terms. The individualism of Europe and America is like a collection of beans with nothing but space between them. In the individualism of Japan, there is a soft restraining substance between the beans, so that the totality is in a gelatinous state. There are a great many cultural and psychological factors which link individuals to one another.

Individualism is indeed essential for the development of modern technology.

Fortunately, since ancient times Japan has been amazingly individualistic. This flies in the face of what is generally believed. Japan is a society in which blood ties are extremely weak. On the other hand, in Korea and China blood ties are virtually the whole story. That would seem not to point toward modern industry. It would point toward commerce, but the style of development which is based on very strong kinship relations does not serve for modern industry.

Modern organization does not emerge from a kinship system. Such organization is not possible in a society where blood ties are strongly operative. Now, modern industry is entirely organized industry. Therefore it cannot successfully evolve where consanguinity is strong. An organization can evolve only through the negation of the kinship system.

Japan is indeed fortunate to have traditionally been a society that is not family-based. In Europe there are societies with rather strong orientation to consanguinity. As a result, we find in those regions that modern industrialization is delayed. In Germany and England, the influence of consanguinity is quite weak. During the war, on a mistaken theory, it was said that Japan was a family-based nation, but that was entirely wrong. In the modern world, Japan is unusual in the degree to which the society is not based on consanguinity.

In Japan's case, and this is something that may date as far back as the Yayoi period (approx. B.C. 300~A.D. 300), there has been tremendously advanced organization of labor groups. That is a major distinguishing feature. We don't know who came up with the idea that Japan is group-based, but it is a big mistake. It is nothing but a myth. Japan is organization-based. The organization always takes precedence.

It may be that since Westerners view the Japanese only as a heterogeneous human group, signs of group-centeredness are all they see. For example, when they are overseas, Japanese play golf in groups. Or at parties the Japanese huddle together exclusively. From these phenomena the idea of Japanese groupiness emerges. However, the number of Japanese going overseas is small; and what with language and communication problems and other assorted cultural and social differences, that sort of phenomenon appears. But it can by no means be said that Japanese society is fundamentally group-based. Judging from the overall conditions of normal Japanese society, it definitely cannot be termed group-based.

Conversely, when we look at Europeans, we see an amazingly group-based society. When Hitler emerged, groups welcomed him with tremendous rousing cheers. That sort of thing does not occur in Japan. In Japan the individual reacts. In groups we never applaud and carry on. Compared to Europe, we can say that Japan has always been far more individualistic. Cases of following blindly are extremely few. Rioting basically does not exist. In modern Japan, rice riots are about the only example of rioting.

6. IS TECHNOLOGY TRANSFER POSSIBLE?

A topic that I would like to see taken up is the question of whether technology transfer is really possible. Is it possible to transfer the advanced technological level of Japan to the countries of Asia? Now if we rule that out, then we are adopting a position of hopelessness, that is, that all of our overseas technological assistance up to now is worthless, so we must choose our words carefully. But is such a thing really possible? What if we were to suppose that fundamentally, the developing countries do not have the soil to cultivate technology?

We say that we transfer Japanese technology to developing countries, yet while we are able to disassemble parts and take them over, it is impossible to export something like the entire framework of this huge Japanese civilization, or—and I regard this too as a technology—the technology for operating it. Although we invite a great many trainees from developing countries here to study Japanese technology, when they return to their countries it all vanishes into thin air. Nothing remains. There is no soil, no system for cultivating such technology. Hence when they return after studying particular technologies, they are unable to use them. When the latest devices are brought over, they are left to gather dust. Even so, if everyone looks at them and says, "Oh, look what we have here," that in itself may have some significance, but in actuality they serve no purpose.

In communist systems, a partial introduction of technology is possible, but when it comes to operating it as an overall civilization system, it is out of the question.

It is possible to claim that it is only a matter of time until the other countries of Asia catch up to Japan, but this is not a matter of a five- or ten-year interval. It would be necessary to posit an immense span of time. For example, in Indian society, could something like women's liberation ever happen? I think it highly unlikely that women could be regarded as a labor force in that society. China has succeeded for the time being. Yet how can they go about transforming the Chinese-style family-centeredness? There are still things which are not at all clear.

In Korea too, there is still a rather strong family-based system, although they have begun to dismantle it. They are some 100 years behind Japan, although it is no mistake to say that in certain respects there is progress toward the nuclear family. What sort of influence does that exert? Something resembling the yangban organization is still firmly entrenched, although they have arrived at a point one step short of abolishing it. There are class-status institutions. A good many premodern elements remain.

Japan, on the other hand, was modern from the start. In this respect it is very different. In Japan there was no premodernity. It was the Meiji government which forcefully ordained the pre-Meiji era as premodern. We should consider Japanese modernity as dating from the 17th century. It did have the social class system, but in its own way it was a modern society.

7. WHAT FORCES SUSTAIN MODERN TECHNOLOGY?

Japanese industry operated from the 18th century on the basis of manpower, not of machine technology.   Compared to the likes of the industrial revolution in England, Japan lagged behind in the development of motive power.   We may say that human power was used in its stead.   To borrow a phrase from Hayami Akira, what we carried out was not an industrial revolution, but an industrious revolution.

It is often said that the Japanese are very dexterous.   Women in particular, once they are trained in such work as sewing, can skillfully accomplish very intricate tasks.   There is a theory that this led to the progress of Japanese industry.   There is some doubt about the area of sewing, but it is thought that a female labor force trained in such areas as sericulture technology and mechanized weaving moved into modern factories and became a resource in the area of machine technology.   Here we see the process of training as a system.   The same trend can be seen in Europe. What is important is not so much dexterity as the achievement of social training.

The topic of women is quite important to a consideration of technology.   The silk mill at Suwa employed mainly farmers' daughters who came from the Hida region, and they were successfully trained.   Earlier, the silk mill at Tomioka employed mainly the daughters of samurai families.   The Gunze firm is a case with which I am specifically familiar.   The Gunze silk mill used samurai daughters as workers, training them and operating successfully.   It achieved quite a high level of efficiency.   In the early Meiji years, it took in the daughters of unemployed samurai from the entire Ayabe district.   They had excellent manners and, as is well known, the mill ran in a perfectly orderly fashion.   This was the foundation for Gunze's outstanding success.   The samurai daughters were well suited to dormitory life, and they carried that attitude with them from the dormitory to the mill.   Many similar cases around the country constitute the backdrop of silk mill development.   This also provided relief to the out-of-work samurai.   In Japan it was not only the samurai class, but also those from farmer and merchant families who were able to undergo collective training.

China is one place where women have not yet been utilized.   The same is true for India.   I have seen a fair number of Chinese factories, and there are very few female workers.   I am informed that in the Islamic nations too, women are not employed on a large scale.

The way in which technology and skill are viewed is another important factor in the promotion of modern technology.   I define skill as "embodied technology." While technology is connected to people, skill is actually built into the flesh.   This embodiment aspect is a point of difference from machine technology.   The work of an artisan is entirely a matter of skill.   Skill is obtained through repetition. Repetition is not a mechanical operation, for the body plays a part in it, and the results of the repetition are engraved into the flesh.   Skill is what the body remembers.

As computers are heavily integrated into technology, the skill which is

separated from the person suddenly loses its face.   Just where we should draw the line between skill and technology is a difficult question, but the interface between the machine and the person is important.   Today's computers do not work well on this point.   What I demand of computers is that they become easier to understand and easier to use.

Turning for a moment to cultural theory, a major difference between Chinese culture and Japanese culture is the way of thinking about the world of objects.   The people of China have virtually no interest in the world of objects.   They are apt, as in the old Sino-Japanese saying, *Ganbutsu soshi*, to lose the sense of purpose when toying with an object.   It's a traditional thing.   The Chinese are highly enthusiastic about techniques of handling people.   This is one of the noble principles throughout Chinese culture.   I am speaking of ethics, which is something in which the Japanese do not have much interest.   How are objects to be handled?   That is the root of Japanese technology.

Technology has the characteristic of being ideology-free, and indeed it has been so since the ancient era.   There is a cultural tradition of taking boundless delight in precise handiwork.   In Japan's case especially, technology has been well loved since ancient times.   The people were totally absorbed in it.   Accordingly, even in cases where Western technology came in, that spirit of total absorption caused it to congeal through improvement and ingenuity.

Cultural issues are also involved in the question of whether merit is or is not attached to industrialization.   In our case, such was the natural progress of civilization, but there are nations which do not possess that value sense.   It may be a question of the society's adaptability to the new technological world.   Europe's adaptability has been rather poor of late.   Indeed, it may be that in that respect it has some resemblance to Asia.   Perhaps in their view, economic prosperity is entirely a superficial matter, something of little import because it gives no meaning to one's life.   In contrast to Japan, that outlook is overwhelmingly strong in China and Korea.   Cultural or international exchange is one thing, but for great civilizations and small cultures alike, cultural introspection is an extremely difficult trick.   They have not achieved it.   We must regard the development of modern industry as the sort of thing which strays from the path of ethics, which has not the slightest comprehension of the way human beings really ought to be.

8.   THE INFORMATIONALIZATION OF TECHNOLOGY

I hope this symposium will take up the subject of the informationalization of science and technology.   I refer to it in the broad sense.   A variety of terms are in use, such as differentiation or added value, and I would like to lump them all together in the word "informationalization."

We can no longer talk of shaping technology so as to satisfy needs, for necessity is something which steadily expands.   Technology is approaching the level of play.   This is the major issue in Japanese technology today, an issue which we

definitely must address.   In short, technology is starting to become art, starting to serve selfish purposes.   Japanese technology has reached that point.   Relative merit is no longer determined by efficiency.

Take the microwave oven as an example.   If we look at it exclusively in terms of its performance in the heat treatment of food, then there is no difference whatsoever with a Korean-made product.   It will be exactly the same.   The difference is in the design.   Design is the most expensive thing, and I have been told by manufacturer's representatives that Korea cannot produce designs which rival those of Japan.   I have heard about cars in which a woman's voice says, "Please fasten your seat belt" as soon as you get in.   And there are automatic vending machines that say, "Thank you very much."   Surely this means the informationalized society has arrived.   The informationalization of technology has progressed to that point.   Today's industry and today's technology have no other direction in which to go.   With the shift of production toward multiple models in small lots, distinctiveness and differentiation are steadily increasing.   This is true for various industrial technologies.   Somewhere within the technology of Japan there now seems to be a spirit of play.

Of course America has made substantial progress in the informationalization of technology.   But such countries as Thailand, Indonesia or India are far behind. And in the former Soviet Union, people labored under the belief that there was a new and different path, but in the end it didn't work.   They are still in some sense in the early stage of industrialization.

9.   TECHNOLOGY WITHOUT NATIONALITY

What new state of affairs is contemporary Japanese technology approaching? Japanese culture is full of things that cannot be divided off from it.   This is because what we might call the civilization theory of modern civilization is after all not disconnected from theories of nationality or of culture.   There are points at which it is pulled into those realms.   The question is—and on this I would like to hear the views of experts on the history of Japan and Japanese thought—is there, in fact, a connection between Japanese thought of the 18th century and the subsequent development of Japanese science or Japanese technology?   If so, what is the nature of the connection?   There was an amazing body of rationalist thought in the 18th century, which probably grew out of Confucianism.   It was a rationalism which can be called an extremely precise Cartesianism, but I am not sure whether it is related to the subsequent development of Japanese technology.

Today's Japanese technology is thoroughly embarked on the path toward non-nationality.   It is becoming something quite universal.   What are we to make of this?   Since we are discussing technology as a comparative study of civilizations, comparisons with Europe and with Asia are vital.   But just what is this supra-national character toward which Japanese technology is steadily advancing?   What are the implications for humankind as a whole?   It is vital that we think about these

issues.

Keeping the above matters in mind, I trust we shall develop a fresh viewpoint on "Technology in the Comparative Study of Civilizations."